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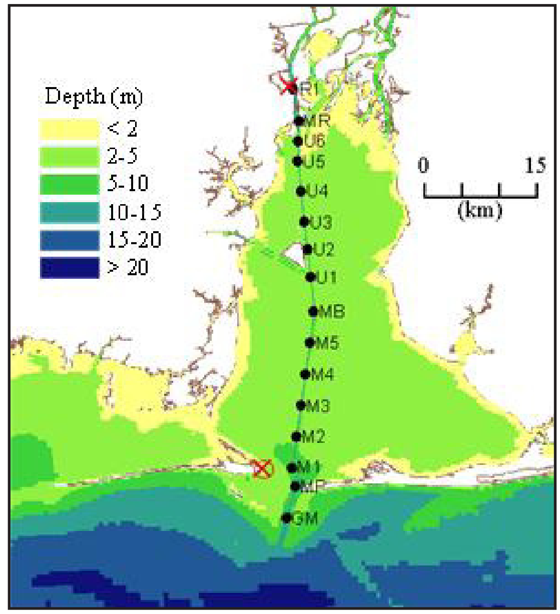
Discovery Porthole

Sharing Research with Educators and the Public

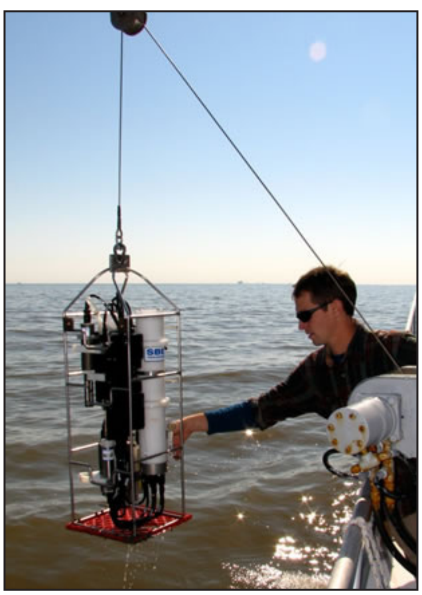
Mobile Bay ship channel: tracking the oil

During the Deepwater Horizon oil spill, the potential for oil to be distributed into and around Mobile Bay was unknown. The movement and redistribution of dissolved or very small particles of oil-based substances remained a concern long after the well was capped. Consequently, NGI researchers at the Dauphin Island Sea Lab quickly began sampling the bay to document the presence of oil and to determine what forces affected oil movement in the bay.



Data collection points, used to track oil, along the Mobile Bay Ship Channel. Figure credit: DISL

Several different environmental and human-induced factors determine how water and particles in the water move along the coast and in Mobile Bay. River discharge, wind, tides and ***topography*** all influence water movement. Heavy, salty water from the Gulf of Mexico is naturally pushed up into the bay like a wedge as the tide comes in. Along with salt water, other heavy materials move into the bay. In relatively large estuaries, like Mobile Bay, movement of these materials primarily occurs along deeply cut, man-made ship channels. Yet, little is known about the flow of materials in these estuaries, largely because of a lack of data. As a result, information was not available about where the oil would end up once it entered the bay and where limited supplies to protect habitats from oil should be placed.



Salinity, temperature, density and dissolved oxygen measurements are collected using a CTD (conductivity, temperature and depth) unit. Photo credit: DISL

Dr. Kyeong Park, a physical oceanographer from the Dauphin Island Sea Lab, and his colleagues conducted sampling surveys in the summer and fall of 2010 along the entire length of the ship channel in Mobile Bay. Information was collected for current speed at different depths using a vessel-mounted acoustic doplar current profiler (ADCP), and data for salinity, temperature, density and dissolved oxygen (DO) using a profiling instrument known as a CTD (conductivity, temperature and depth). Measurements for ***river discharge***, wind, and water level were also obtained.

Initial results have shown the ship channel as having a distinctly layered water column with drastic differences in the bottom and surface salinity. The bottom water was often lacking in oxygen, with the DO less than that which is desired by marine life and even sometimes ***hypoxic*** (level lower than what is required to sustain life). This study occurred over a large area and for a relatively long period of time, the first of its kind in Mobile Bay. And, while conducted in Mobile Bay, the information gained in this research is applicable to other similar estuaries in the northern Gulf of Mexico. As a result, scientists will continue to thoroughly analyze the data collected to study the mechanisms that determine the movement of water and other materials along the ship channel and within the bay.

Education Extension

Key Terms: *ecosystem, habitat, water quality, pollution*

Classroom Activity: Oceanography to Limnology

Scientists use a variety of techniques to gather information about aquatic habitats. Whether it be Mobile Bay, the Gulf of Mexico, a creek or pond, scientists use similar methods for analyzing the physical and chemical properties of a body of water. Monitoring water quality is important in determining the health of an ecosystem and for identifying potential problems such as pollution.

Supplies: *thermometer, refractometer, water chemistry kit, measuring tape or yard stick, data sheet, i.d. guides*

Ocean Literacy Principles: 1. The Earth has one big ocean with many features, 5. The ocean supports a great diversity of life and ecosystems, 6. The ocean and humans are inextricably interconnected, 7. The ocean is largely unexplored

National Science Standards: A. Science as Inquiry: Abilities necessary to do scientific inquiry; C. Life Science: Populations and ecosystems; E. Science and Technology: Understanding about science and technology

Directions: 1) Discuss an aquatic habitat close to your home or school. Is it fresh or saline, still or flowing, urban or rural? 2) Determine if you will be oceanographers (marine) or limnologists (freshwater). 3) Visit the habitat and discuss what factors may influence its physical, chemical and biological components. 4) Conduct a variety of water quality tests (i.e., dissolved oxygen, pH, turbidity, etc.). 5) Measure the depth and width and discuss what influences the size and shape. 6) Use a variety of nets (plankton, fish, insect) to sample the wildlife. 7) Repeat at a different time of the day, year, or with a different body of water. Compare and contrast your results. Discuss what factors make them similar or different.

Visit **http://dhp.disl.org/resources.html** for lesson plans and additional marine-related activities.

**Use the key terms above to search for additional lesson plans on the web!*

Did You Know...

The ***topography*** or shape and depth of the floor of Mobile Bay has been dramatically altered from its natural state to accomodate commercial shipping traffic and other human uses. While the average depth of the bay is 10 feet, the shipping channel is 45 feet deep and runs the entire length of the bay. This man-made trench not only alters water movement but sediment movement as well.

The ***river discharge*** into Mobile Bay has also been alterred by the damming of rivers and other blockages like the creation of the Mobile Bay causeway (Hwy. 90).

Hypoxic areas are those lacking enough oxygen to support life. Hypoxia can occur throughout the water column but is most common near the bottom, a natural result of plant and animal decay. Large areas of hypoxic water are referred to as dead zones and are often the result of pollution from farmlands, golf courses, urban development, etc.

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